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WATER SUPPLY OUTLOOK

and
FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS

for

MONTANA

UNITED STATES DEPARTMENT of AGRICULTURE...SOIL CONSERVATION SERVICE, and MONTANA AGRICULTURAL EXPERIMENT STATION

Data included in this report were obtained by the agencies named above in cooperation with Federal, State, and private organizations listed on the inside back cover of this report.

FEB. 1, 1966

UNITED STATES DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

To Recipients of Water Supply Outlook Reports:

Most of the usable water in western states originates as mountain snowfall. This snowfall accumulates during the winter and spring, several months before the snow melts and appears as streamflow. Since the runoff from precipitation as snow is delayed, estimates of snowmelt runoff can be made well in advance of its occurrence Streamflow forecasts published in this report are based principally on measurement of the water equivalent of the mountain snowpack.

Forecasts become more accurate as more of the data affecting runoff are measured. All forecasts assume that climatic factors during the remainder of the snow accumulation and melt season as they affect runoff will add to be an effective average. Early season forecasts are therefore subject to a greater change than those made on later dates.

The snow course measurement is obtained by sampling snow depth and water equivalent at surveyed and marked locations in mountain areas. A total of about ten samples are taken at each location. The average of these are reported as snow depth and water equivalent. These measurements are repeated in the same location near the same dates each year.

Snow surveys are made monthly or semi-monthly from January 1 through June 1 in most states. There are about 1400 snow courses in Western United States and in the Columbia Basin in British Columbia. In the near future, it is anticipated that automatic snow water equivalent sensing devices along with radio telemetry will provide a continuous record of snow water equivalent at key locations.

Detailed data on snow course and soil moisture measurements are presented in state and local reports. Other data on reservoir storage, summaries of precipitation, current streamflow, and soil moisture conditions at valley elevations are also included. The report for Western United States presents a broad picture of water supply outlook conditions, including selected streamflow forecasts, summary of snow accumulation to date, and storage in larger reservoirs.

Snow survey and soil moisture data for the period of record are published by the Soil Conservation Service by states about every five years. Data for the current year is summarized in a West-wide basic data summary and published about October 1 of each year.

Listed below are water supply outlook reports based on Federal-State-Private Cooperative snow surveys. Those published by the Soil Conservation Service may be obtained from Soil Conservation Service, Room 507, Federal Building, 701 N. W. Glisan, Portland, Oregon 97209.

	PUBLISHED BY SOIL	CONSERVATION SERVICE	E
REPORTS	ISSUED	LOCATION	COOPERATING WITH
RIVER BASINS			
VESTERN UNITED STATES	MONTHLY (FEBMAY)	PORTLAND, OREGON	_ ALL COOPERATORS
BASIC DATA SUMMARY	OCTOBER 1	PORTLANO, OREGON	_ ALL COOPERATORS
STATES			
AL ASK A	MONTHLY (MAR MAY)	PALMER, ALASKA	ALASKA S.C.D.
AR 1 ZON A	SEMI-MONTHLY (JAN.15 - APR.1)	PHOENIX, ARIZONA	SALT R. VALLEY WATER USERS ASSOC ARIZ, AGR. EXP. STATION
COLORADO ANO NEW MEXICO	MONTHLY (FEBMAY)	_ FORT COLLINS, COLORAGO	— COLO. STATE UNIVERSITY COLO. STATE ENGINEER N. MEX. STATE ENGINEER
IDAHO	MONTHLY (JANJUNE).	BOISE, IOAHO	IDAHO STATE RECLAMATION ENGINEER
MONTANA	MONTHLY (JANJUNE)-	BOZEMAN, MONTANA	MONT. AGR. EXP. STATION
NEVADA	MONTHLY (JAN MAY)	RENO, NEVAOA	NEVACA DEPT. OF CONSERVATION AND NATURAL RESOURCES - DIVISION OF WATER RESOURCES
OREGON	MONTHLY (JAN JUNE)_	PORTLANO, OREGON	OREG. STATE UNIVERSITY OREGON STATE ENGINEER
UTAH	MONTHLY (JAN JUNE).	_ SALT LAKE CITY, UTAH _	UTAH STATE ENGINEER
WASHINGTON-	MONTHLY (FEB JUNE).	SPOKANE, WASHINGTON	WN. STATE DEPT. OF CONSERVATION
WYOMING.	MONTHLY (FEBJUNE)	CASPER, WYOMING	WYOMING STATE ENGINEER
	PUBLISHED E	BY OTHER AGENCIES	

REPORTS ISSUED AGENCY WATER RESOURCES SERVICE, DEPT. OF LANOS, FOREST AND WATER RESOURCES, PARLIAMENT BLOG., VICTORIA, B.C., CANADA ___MONTHLY (FEB. - JUNE) ___ ____ MONTHLY (FEB. - MAY)___ - CALIF. DEPT. OF WATER RESOURCES, P.O. BOX 388, SACRAMENTO, CALIF.

WATER SUPPLY OUTLOOK

FEDERAL-STATE-PRIVATE COOPERATIVE SNOW SURVEYS

for

MONTANA

Report Prepared

Ву

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And

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MONTANA WATER SUPPLY OUTLOOK as of February 1, 1966

Snow survey measurements near February 1 indicate the snow pack is about 15 percent above average on the Kootenai River headwaters in British Columbia. The Flathead River drainage has a snow pack about 90 percent average while the Clark Fork has about 80 percent average. Only two courses are measured in the Bitterroot and they indicate about 60 percent of average accumulation to date.

East of the divide the snow pack is presently 75 to 80 percent average on the Jefferson, Madison and Yellowstone River drainages. The Gallatin drainage is near 65 percent average while snow courses west of Helena near the Continental Divide register about 50 percent average for this date.

Streamflow for the April through September period is expected to be near average on the Kootenai River, a little below average on the Flathead River and 70 to 80 percent average in the Clark Fork drainage.

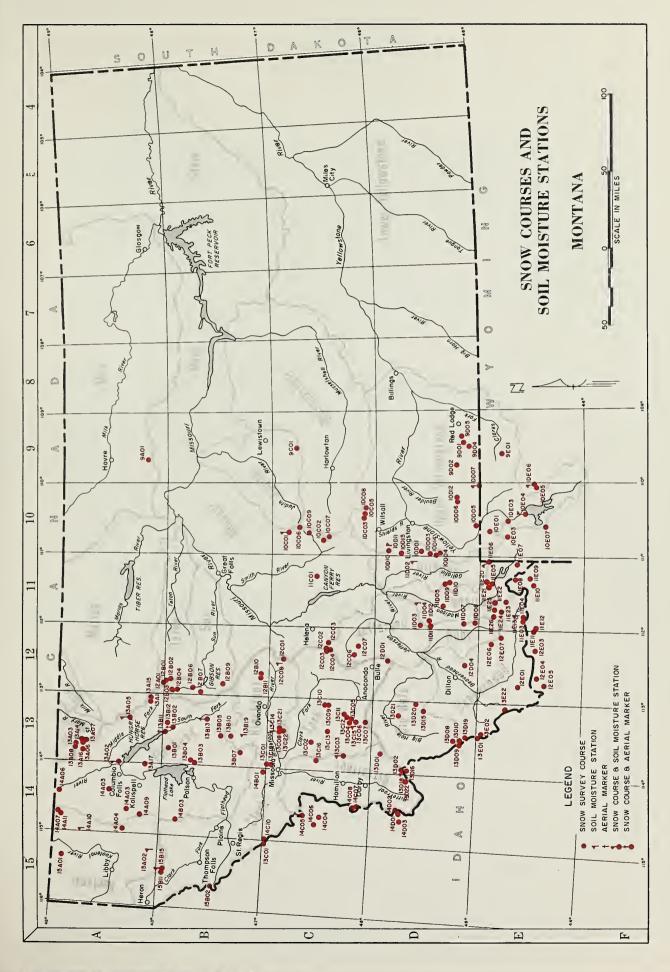
Flows in the Jefferson, Madison and Gallatin Rivers and on streams tributary to the Missouri above Great Falls are anticipated to be near or below the low volumes recorded in 1961. Even if precipitation is above average for the remainder of the snow accumulation period, late season water supplies will be below average in these areas. No shortages are expected on streams with reservoir storage.

Storage in irrigation reservoirs is generally above average and with proper regulation, all reservoirs are expected to fill.

Water contained in the soil under the snow pack is generally above average.

Snow pillow data for Lick Creek for 1964 and 1965 seasons are included in this report along with the 1966 season to date for the four snow pillows presently in operation.



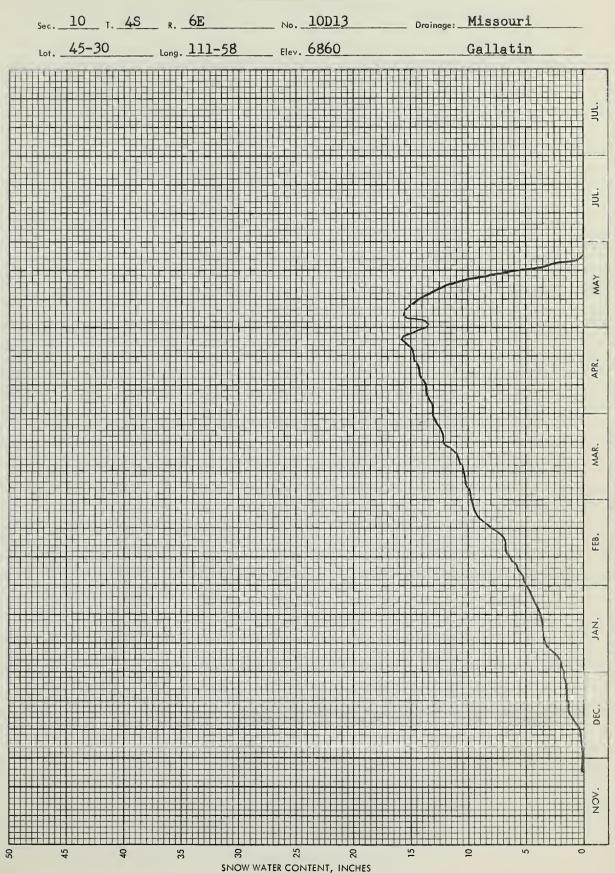


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	Drainaga Basin & Course Name		KOOTENAI RIVER Bares Treil Murphy Jake R. S. Raven R. S.		CLARK FORK RIVER Georgetown Lake Lubrecht Forest Sealby Lake Skalkaho Suzait BITTERROOT RIVER	Gibbona Pesa Lolo Pasa	BEAVERHEAD RIVER Lakeviev MADISON RIVER	Red Bluff GALLATIN RIVER	Bridger Bowl Collage Site Twenty-One Hila MISSOUR! RIVER N	Kinga Hill Stempla Pasa YELLOWSTONE RIV	Battle Ridge Northeast Entrance			1,2,3	Muserala refer to Agency that accured in U. S. Postet Service 2. U. S. Postet Service 3. U. S. Geological Survey 4. Nothern Power Company 5. U. S. Indian Service		
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	Frainage Basin & Course Mase	A N T T T T T T T T T T T T T T T T T T	Bares Creak Bares Trail Brush Greek Graws Creek	Weasal Divide FLATHEAD RIVER Bassoo Peak	Ble Streat Ble Creat Casp Kissry Dessrt Wonteain Fatty Creat Cunfile Creat Divide Cunfile Lite Cunfile Continues Cunfile Continues Cunfile Continues Continu	Entrova Edshench Logan Greek Martas Pass Mineral Greek North Fork Jocko	Spotted Boar Mountain Tribusa Late Twin Greeks Upper Rolland Laks CLARK FORK RIVER		Copote Hill El Dorado Mine Fred Burr Pess Gold Creek Lake Heart Lake Frail Hoodoo Creek				José Horse Mos Perce Camp Nos Perce Pass	Saddle Mountain 133 Twin Lakes 144 ST. MARY RIVER 8ASIN			BEAVERHEAD RIVER Bloody Dick Carter Creack Did Creat Lake Cod Stone Likeries Springs Gold Stone Likeries Carron Likeries Kidge Fran Creat Tran Creat White Fine Ridge

SNOW PILLOW DATA

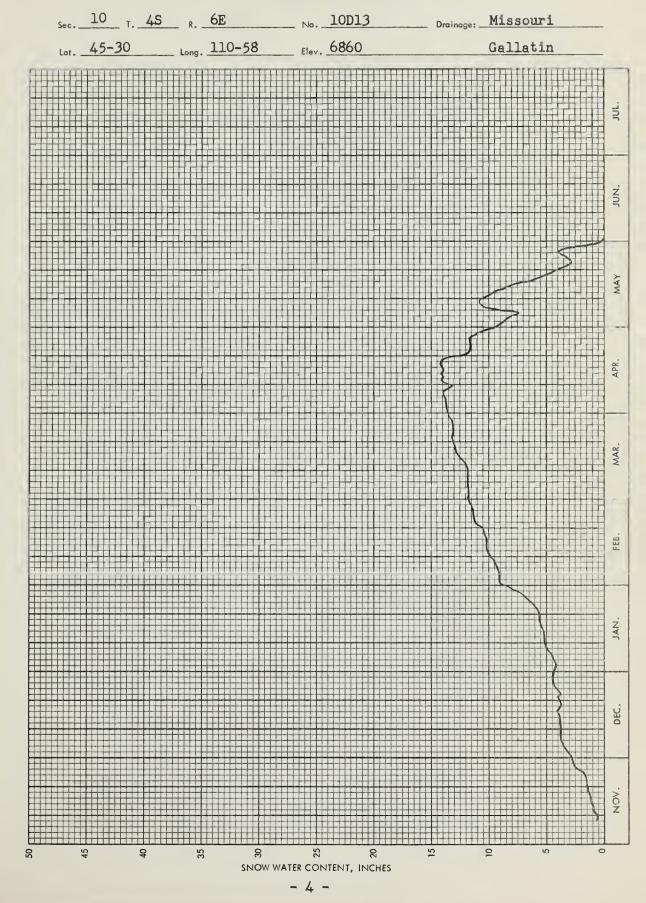
AS OF ______1964





LICK CREEK SNOW PILLOW DATA

AS OF ______1965





BLACK PINE SNOW PILLOW DATA

AS OF FEBRUARY 1, 1966

Sec. 26 T.	8N R.	15W	No13C13	Drainage: Columbia	
Lot. 46-25	Long.	113-26	Elev. 7100	Clark Fork	
					JUL.
					NOU.
					MAY
					APR.
					MAR.
					FEB.
					JAN.
					DEC.
920	75.		22 & RATER CONTENT, INCHES	5 00 00 00 00 00 00 00 00 00 00 00 00 00	NOV.



BRIDGER BOWL

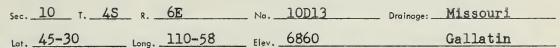
SNOW PILLOW DATA

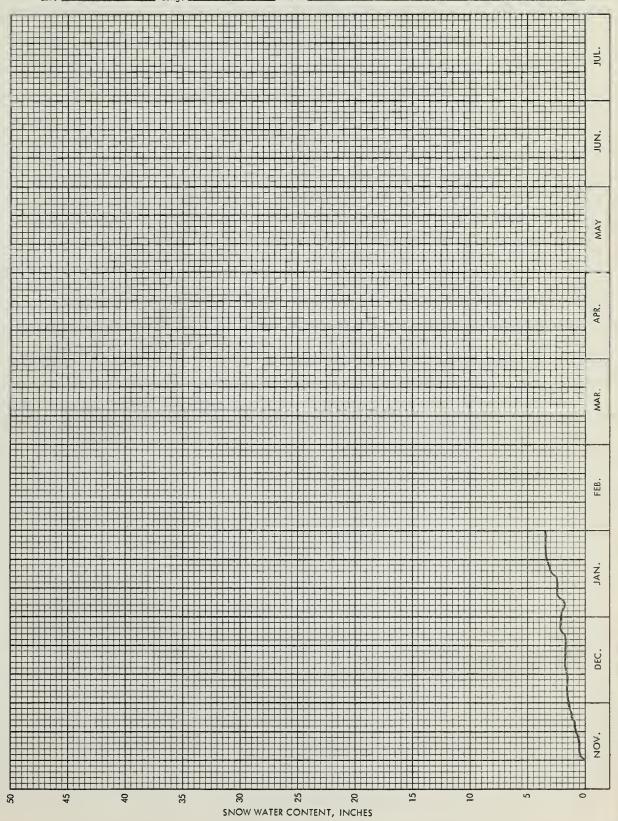
AS OF FEBRUARIE, 1966

	Sec.	25 T.	ln_	R. 6E	No. 10D15	Drainage:Missouri	
					Elev. 7250	Gallatin	
							JUL.
							JUL.
							MAY
							APR.
							MAR.
							FEB.
							JAN.
							DEC.
							NOV.
50		2 4	04	8 8 8	WATER CONTENT, INCHES - 6 -		



LICK CREEK SNOW PILLOW DATA AS OF FEBRUARY 1, 1966

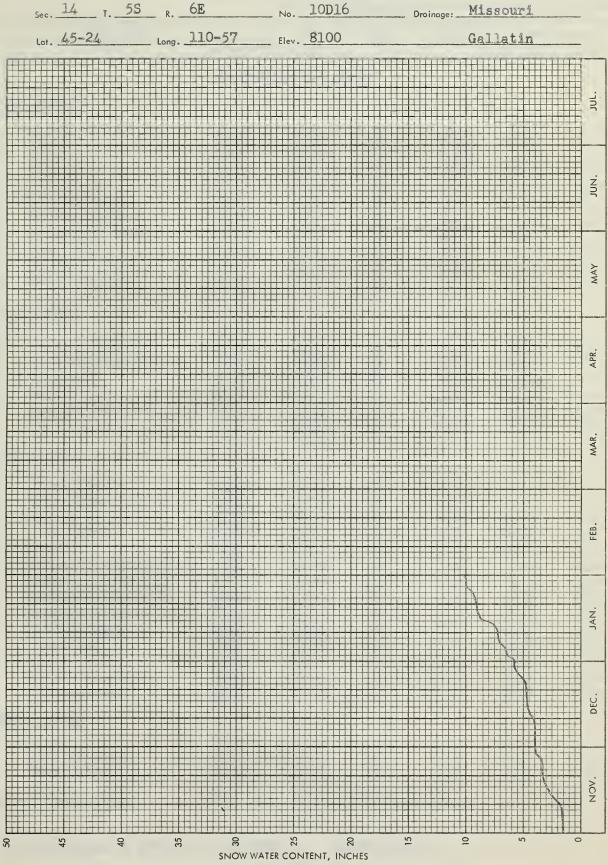






SHOWER FALLS SNOW PILLOW DATA

AS OF FEBRUARY 1, 1966





SNOW SURVEY DATA

AS OF FEBRUARY 1, 1966

		AS UP I	LDRUARI 1	., 1900			tinches
				CURRENT DATA		PAST	RECORD
	SNOW COURSE		DATE	SNOW DEPTH	WATER	WATER	CONTENT
NO.	MAME	ELEVATION	SURVEY			LAST YEAR	AVERAGE
		COLUMBI	A RIVER E	BASIN			
KOOTENA	I RIVER						
BC 10 BC 12A BC 11 BC 43 BC 33 BC 32 BC 10B BC 10A BC 8A	Fernie Field Glacier Gray Creek Kicking Horse Marble Canyon Morrissey Ridge New Fernie Sinclair Pass	3500 4200 4100 5100 5400 5000 6100 4100 4500	1/31 1/29 2/1 1/30 1/31 1/31 2/1 1/31 1/31	42 31 81 52 54 57 75 57	9.1 6.4 22.2 11.9 13.0 13.2 24.4 14.1 5.3	11.6 6.9 15.1 13.7 10.7 9.6 22.4 14.3 4.4	7.3 5.1 19.6 12.6* 10.8 11.1 - 10.8* 4.6*
BC 20A	Sullivan Mine	5100	1/28	40	10.5	10.8	9.5
FLATHEAL	O RIVER						
13A02 14A03 13B13 13A05 13B02 13B11	Desert Mountain Hell Roaring Divide Holbrook Marias Pass Spotted Bear Mountain Twin Creeks	5600 5770 4530 5250 7000 3580	1/31 1/28 1/30 1/27 1/30 1/30	36 66 23 47 36 33	10.0 18.2 6.0A 13.0 10.2A 8.6*	16.2 28.5 9.8A 15.3 13.0A 11.6A	10.8* 7.7* 12.9 11.2* 9.8*
CLARK FO	ORK RIVER						
13013 13013 13810 13004 15802 13021 13022 13008 13005 13018 13007 13006 13001 14801	Black Pine Black Pine Pillow Coyote Hill Intergaard Lookout Lubrecht Forest No. 3 Lubrecht Forest No. 4 Lubrecht Forest No. 6 Southern Cross Spring Gulch Storm Lake Stuart Mill Stuart Mountain TV Mountain	4650	1/27 1/27 2/1 2/1 1/31 1/29 1/29 2/1 1/30 1/28 2/1 1/30 1/28	26 SP 25 19 71 20 12 13 16 35 21 17 58 40	6.8 6.5 6.2 4.0 21.6 4.6 2.2 2.4 3.1 8.1 5.0 3.4 15.1 11.2	10.2 8.4 27.7 7.0 4.6 4.8 6.6 14.0 12.9 6.4 31.4 15.9	7.8* 5.4 26.4 5.8* 2.9* 3.6* 4.3 8.8* 8.9* 4.4 21.9*
DITTERK	OI KIVEK						
13D02 13D16	Gibbons Pass Moose Creek	7100 6200	1/31 1/28	36 26	9.4 5.8	23.8 17.0	15.7* 11.4*

A - Aerial observation - w. c. est. SP - Snow pillow observation - w. c. only.



SNOW SURVEY DATA

AS OF FEBRUARY 1, 1966

							tinches
				URRENT DATA		Y PAST	RECORD
	SNOW COURSE		DATE	SN OW DEPTH	WATER	WATER	CONTENT
110.	NAME	ELEVATION	SURVEY			LAST YEAR	AVERAGE
		MISSOURI	RIVER B	ASIN			
BEAVERH	EAD RIVER						
12E03	Camp Creek	6800	1/28	24	5.6	13.3	6.5
12D04	Carter Creek	7400	1/31	12	2.2	4.5	- 6 1
11E12	Kilgore	6200	1/28	25	5.8	10.6	6.4
	ON RIVER						
12006	Picnic Grounds	6500	2/1	11	1.7	3.3	3.3
12D01	Pipestone Pass	7200	1/27	12	2.0	3.4	3.3*
MADISON	RIVER						
11E09	Big Springs	6500	1/28	41	10.5	22.2	13.7
11E05 11E10	Hebgen Dam Island Park	6550	1/31 1/28	19 36	4.1	12.6	8.1 10.8
10E02	Norris Basin	6315 7500	1/28	24	8.4 5.8	19.4 11.5	6.9*
11E08	Valley View	6500	1/28	34	8.4	23.5	9.6
11E07	West Yellowstone	6700	1/31	22	5.8	13.4	7.8
GALLATI	N RIVER						
10D14	Arch Falls	7350	1/29	18	4.2	11.0	7.3*
10D15	Bridger Bowl Pillow	7250	1/31	SP	10.3	- 07. 4	- ~×
10D04 10D03	Devil's Slide Hood Meadow	8100 6600	1/29 1/29	30 14	7.2 3.0	21.8 8.4	12.7* 5.5*
10D13	Lick Creek Pillow	6860	1/31	SP	3.5	-	
10D01	New World	6700	1/31	19	4.1	7.7	6.6
10D16	Shower Falls Pillow	8100	1/31	SP	10.3	-	-
11E06	Twenty-One Mile	7150	1/31	37	10.4	23.1	12.1
MISSOUR							
12005	Chessman Reservoir	6200	2/1	8	1.3	3.1	3.1
12CO2 13CO3	Ten Mile Lower Ten Mile Middle	6600 6800	2/1 1/31	13 20	2.3	6.2	4.9
12004	Ten Mile Upper	8000	1/31	23	4.3 5.0	9.8 13.3	7.3 9.1
· ·	ELLOWSTONE RIVER		2, 32	~2	7.0	±2,0	702
10E03	Canyon	77 50	1/30	31	7.7	21.7	9.4
10E06	East Entrance	7000	1/28	28	5.7	10.4	7.9*
9D05	Grizzly Peak	8400	1/31	23	6.4	9.8	7.1*
10E04	Lake Camp	7850	1/31	24	4.0	10.9	6.5*
9E01 10E01	Lodgepole Lupine Creek	8200 7 3 00	2/2 1/30	21 23	4.6 5.7	10.0 10.4	6.6* 7.3
10D07	Northeast Entrance	7400	1/31	17	3.8	10.4	5.8
10E05	Sylvan Pass	7100	1/29	28	7.7	16.0	
10E07	Thumb Divide	7900	1/27	48	15.4	27.3	14.4*
A - Aer	ial observation - w. c.	est. SP	- Snow p	illow obs	ervation	- w. c.	only.

NOTE: ALL AVERAGES BASED ON 1948-1962 (15 YEAR PERIOD). *ADJUSTED AVERAGE

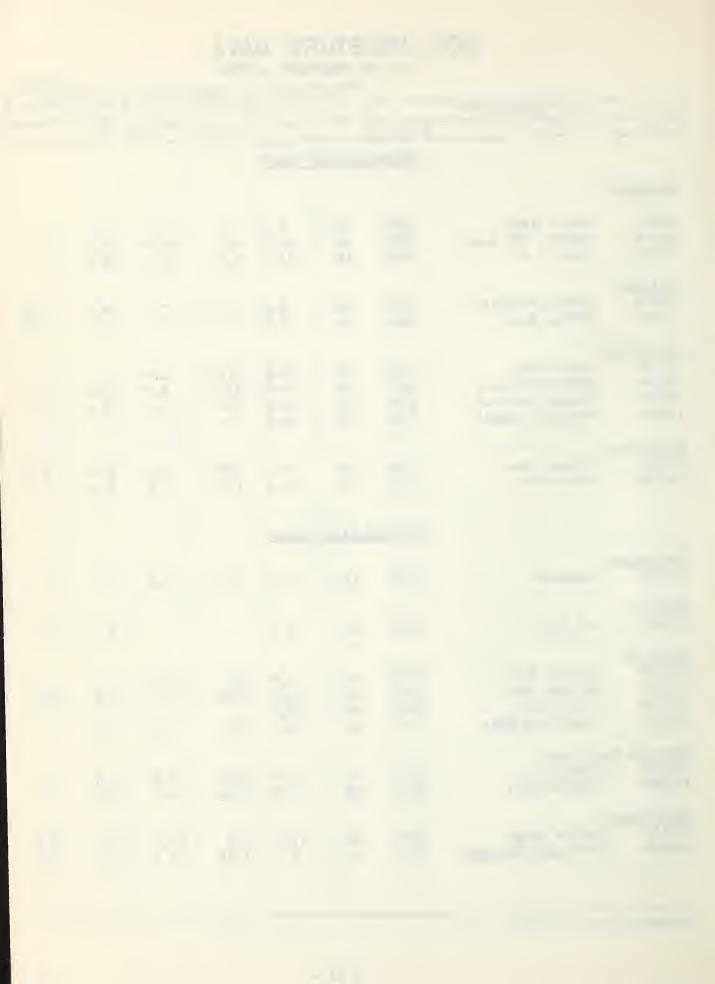


SOIL MOISTURE DATA

AS OF FEBRUARY 1, 1966

(Inches) SOIL PROFILE PAST RECORD CURRENT DATA SOIL MOISTURE STATION DATE SOIL LAST FIELD * AVERAGE DEPTH 0F CAPACITY MOISTURE YEAR NO. NAME ELEVATION SURVEY COLUMBIA RIVER BASIN Koootenai 15B15M Baree Trail 3800 48 7.5 2/1 22.6 19.6 14A1OM Murphy Lake R.S. 3000 48 19.9 15A02M Raven R.S. 3050 48 23.0 2/220.7 22.0 Flathead 13A02M Desert Mountain 1/31 6.8 5600 54 8.4 7.2 7.1 13A05M Marias Pass 5250 54 6.5 5.5 5.0 Clark Fork 13C13M Black Pine 7100 48 10.0 1/27 4.9 13C15M 6450 1/27 Georgetown Lake 48 9.0 3.7 2.6 2.7 13B19M Seeley Lake R.S. 4030 48 2/2 10.0 11.9 7.5 13CO3M Skalkaho Summit 7260 48 10.8 Bitterroot 13D18M Gibbons Pass 1/31 7100 48 7.1 5.0 5.5 5.6 14C05M Lolo Pass 5250 48 10.6 1/30 6.3 7.7 MISSOURI RIVER BASIN Beaverhead 11E13M Lakeview 6700 48 15.3 1/31 6.0 11.2 8.3 Madison 10D04M Red Bluff 4800 40 4.7 2.3 2.1 Gallatin 10D15M Bridger Bowl 7250 48 15.8 2/1 15.1 11D02M 1/28 College Site 4856 54 14.5 13.5 10.0 8.9 10D13M Lick Creek 6860 48 18.8 11E06M Twenty-One Mile 7150 48 10.0 1/30 3.1 1.5 Missouri Main Stem 10C01M Kings Hill 7420 48 11.8 1/25 9.0 7.8 12C08M Stemple Pass 6350 48 5.9 1/31 4.4 4.2 Yellowstone 2/1 10D11M Battle Ridge 6020 48 17.6 12.7 12.6 15.3 10D07M Northeast Entrance 48 1/31 7350 9.4 7.7 5.8 7.0

^{**}AVERAGE FOR PERIOD OF RECORD



RESERVOIR STORAGE DATA

	AS OF	JANUARY 31,	1966		(1000 Acre Feet)
				USEABLE STORAG	
BASIN	RESERVOIR	USEABLE CAPACITY	THIS YEAR	LAST YEAR	AVERAGE
COLUMBIA RIV	ER BASIN				
Flathead	Hungry Horse Flathead Lake	3,428.0 1,791.0	2,381.0 1,418.0	2,811.0 1,384.0	2,693.4** 1,042.9
	Camas (Sum of 4) Mission Valley (Sum of 8)	45.2 100.3	27.3 57.2	18.8 36.5	30.4 31.9
Clark Fork	Georgetown Lake Noxon Rapids	31.0 334.6	28.7 324.5	29.6	24.5
Bitterroot	Como	34.9	13.1	12.0	10.8
	Painted Rocks	31.7		-	14.0**
MISSOURI RIV	ER BASIN				
Beaverhead	Clark Canyon	328.9	151.2	66.3	-
Ruby	Lima Ruby	84.0 38.8	45.1	-	26.0 18.4**
Madison	Hebgen Lake	377.5	222.3	220.8	180.4
Gallatin	Ennis Lake Middle Creek	41.0 8.0	39.9 1.4	37.1 3.7	36.8 3.3**
Missouri	Canyon Ferry	2,043.0	1,568.0	1,831.0	1,553.9**
	Hauser & Helena Lake Helena	61.9 10.4	60.7 10.0	59.6 9.6	51.6 7.2
	Holter Lake	81.9	81.0	63.5	59.6
	Smith River	10.7	7.9	8.5	5.2**
	Ackley Lake Durand	5.8 7.0	5.9	5.5	3.6 3.9**
	Martinsdale	23.1	12.1	7.6	8.4**
	Deadman's Basin	72.2	66.2	43.0	39.5**
Sun	Fort Peck Gibson	19,410.0 105.0	17,000.0 55.5	15,290.0 46.2	10,575.1 55.7
buii	Willow Creek	32.3	23.8	15.6	19.2
	Pishkun	32.0	18.8	17.4	18.7
Marias	Lower Two Medicine			-	000
	Four Horns Swift	19.2	12.3	_	10.4 19.9
	Lake Frances	112.0	94.2	_	91.7
249 73	Tiber	1,347.0	672.3	678.3	628.0**
Milk	Fresno Nelson	127.2 66.8	85.1 51.0	64.4 36.7	59.4 36.7
	Lake Sherburne	66.1	11.3	J0.7	18.4
Yellowstone	Mystic Lake	20.8	12.8	11.8	10.6
	Tongue River	68.0		-	11.2
	Cooney	27.5	17.3	14.5	10.8**
Big Horn	Boysen	757.8	345.9	326.5	417.4
	Buffalo Bill	421.3	283.9	174.4 85.6	216.6 68.4
	Bull Lake Yellowtail	152.0 1,409.0	106.5 146.2	-	-
	TOTTOROGIT	1,40/00	±40 €€		



Agencies Cooperating in Collecting Data Contained in this Bulletin

- U. S. Forest Service Region 1, Missoula, Montana
- U. S. Geological Survey Helena, Montana
- U. S. Army Corps of Engineers Portland, Oregon Seattle, Washington Omaha, Nebraska
- U. S. Indian Irrigation Service St. Ignatius, Montana
- U. S. Weather Bureau Helena, Montana
- U. S. Bureau of Sports Fisheries and Wildlife Red Rock Lakes Refuge Monida, Montana
- U. S. Bureau of Reclamation Billings, Montana Boise, Idaho
- U. S. Soil Conservation Service Montana, Wyoming, Idaho
- Soil and Water Conservation Districts Montana Counties
- U. S. Bonneville Power Administration Portland, Oregon

- U. S. National Park Service Yellowstone National Park Glacier National Park
- Montana Power Company Butte, Montana
- State Water Conservation Board Helena, Montana
- North Montana Branch Station Agricultural Experiment Station Havre, Montana
- Montana State University
 Agricultural Experiment Station
 Bozeman, Montana
- University of Montana School of Forestry Missoula, Montana
- Johnson Flying Service, Inc. Missoula, Montana
- Water Rights Branch, Dept. of Lands and Forests Victoria, British Columbia
- Department of Northern Affairs and National Resources Calgary, Alberta

UNITED STATES DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE P. 0. BOX 855
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COOPERATIVE SNOW SURVEYS

Furnishes the basic data necessary for forecasting water supply for irrigation, domestic and municipal water supply, hydro-electric power generation, navigation, mining and industry

"The Conservation of Water begins with the Snow Survey"